# WEEDS and TURF

PEST CONTROL

MARCH 1963

Monthly news for contract sprayers of weeds, turf, ornamentals, and trees

Contract sprayer on soil sterilization job on roadways inside an industrial establishment.


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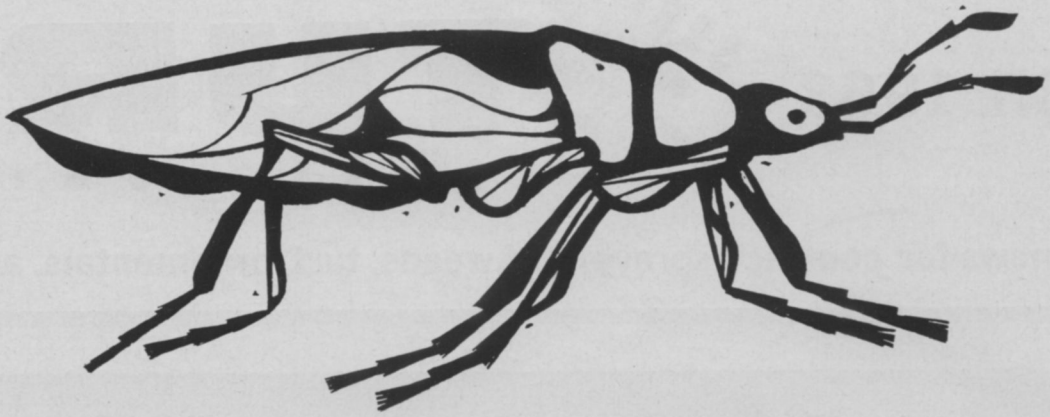
## SOIL STERILIZATION:

## What it means, what to use, How to do it . . . . . W-10



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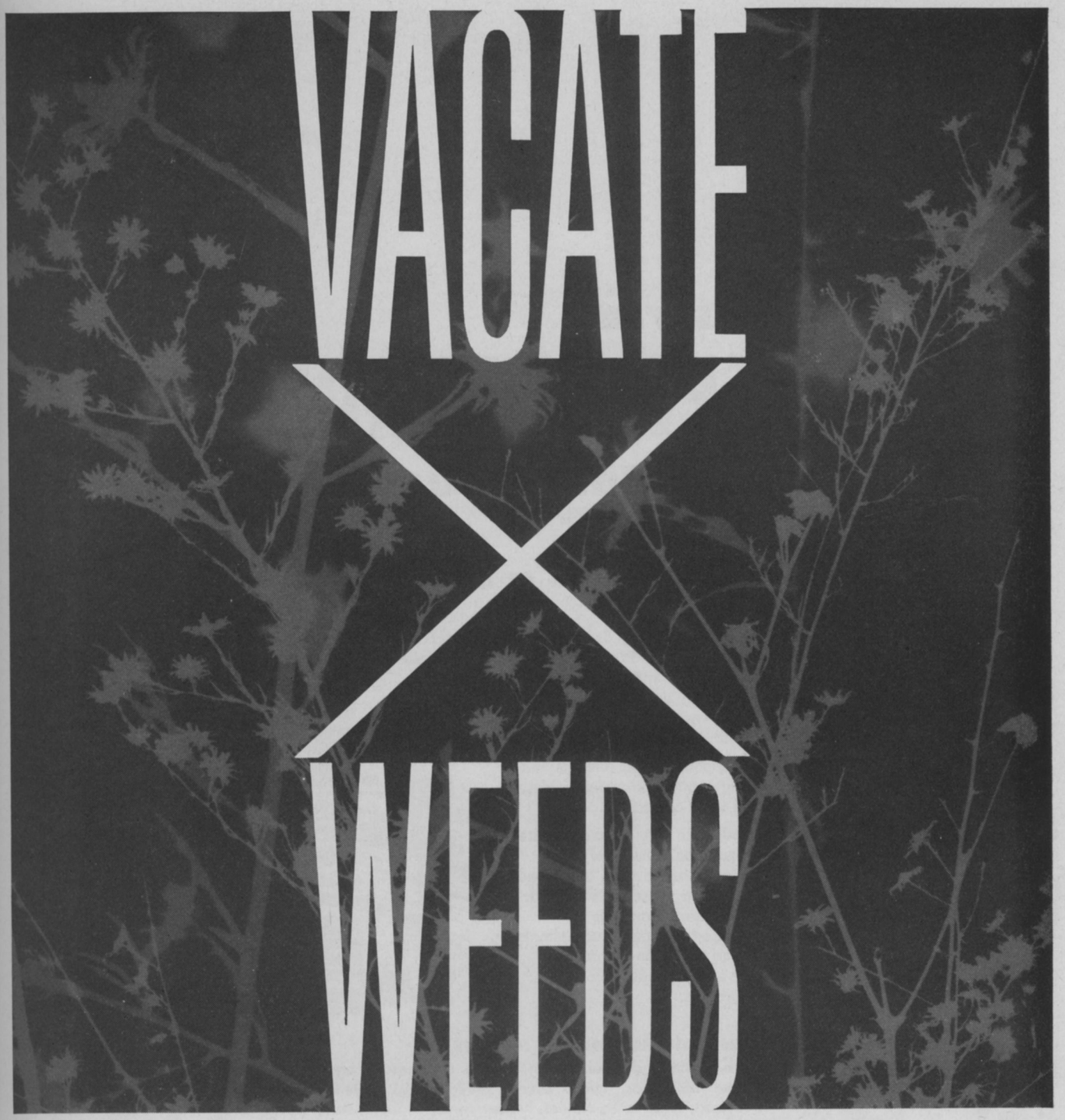


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**WEEDS and TURF**
PEST CONTROL
A SECTION OF PEST CONTROL MAGAZINE

**March, 1963**

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## *Four steps*

Young, growing industries are always beset with problems, some of which come from within the ranks, some which come from outside. Custom spraying is no exception.

One of the most persistent and irritating headaches facing America's contract applicators today is an internal one:

How can we as businessmen make sure our competitors and fellow spraymen maintain a high code of ethics?

And the answer is simple enough; every CA should be certain his *own* business practices set an example of sound, responsible, conscientious habits.

To do this it is necessary to get a clear picture of the building blocks needed to construct an ethical house.

First, and most obvious, reputable spraymen know they shouldn't skimp on quality of work performed. This means proper and adequate chemicals, and thorough application.

Second, prices should not be set exorbitantly high just to make unreasonable profit. This is very rare. What is more common, and equally wrong, are prices which have been shaved just to get business, but which are not high enough to leave any profit. This is as unfair to the price-cutting company and its employees as it is to competitors.

Third, advertising methods should be based strictly on facts, and should not mislead present or potential customers in any way.

Fourth, ethical applicators should not belittle competitors when making a sales call. If there are complaints about a rival firm, they should be worked out by the men involved, either privately, or through a local business or trade association.

*Four simple steps.* It seems these guides to ethical business are already practiced by most spray companies. But for the few whose thinking is a little cloudy, it's worth reviewing them again.

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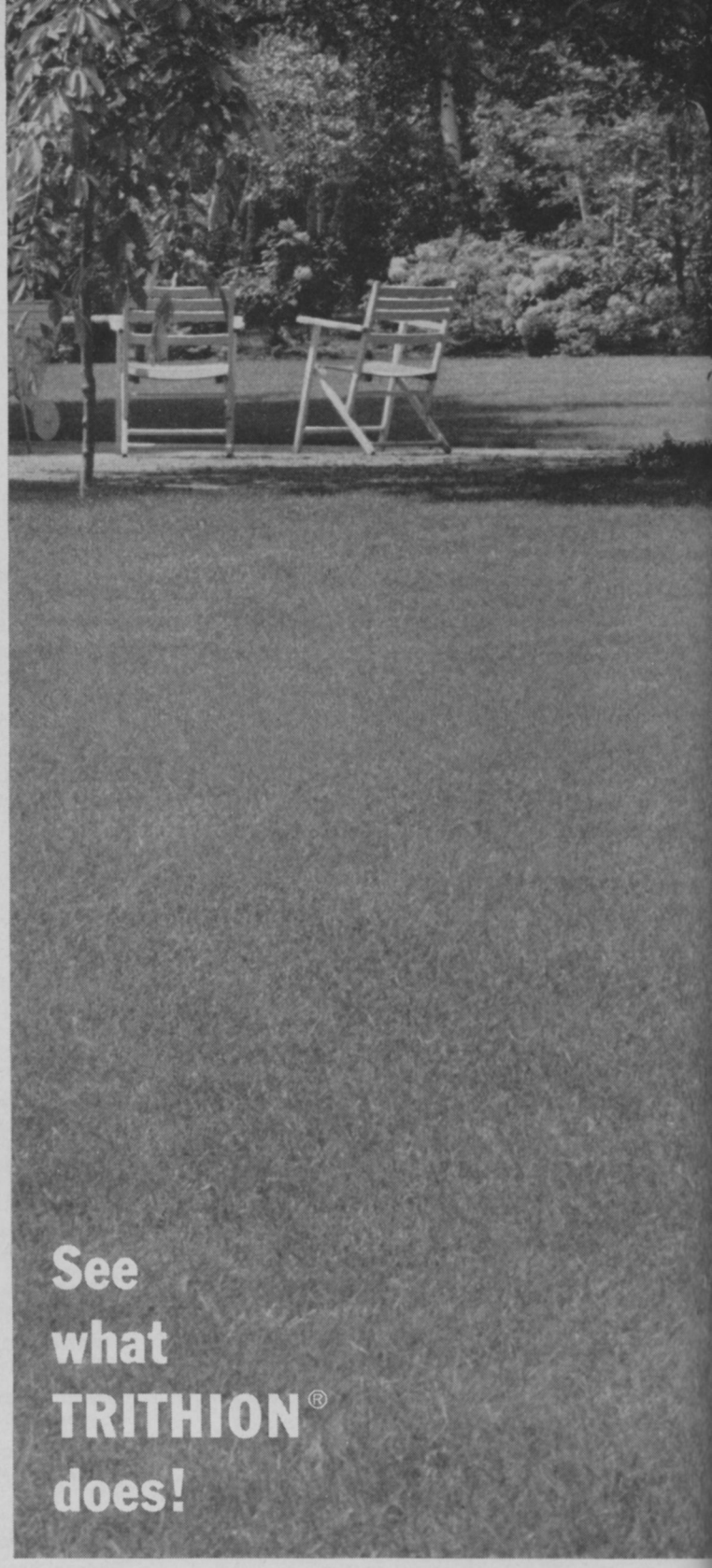


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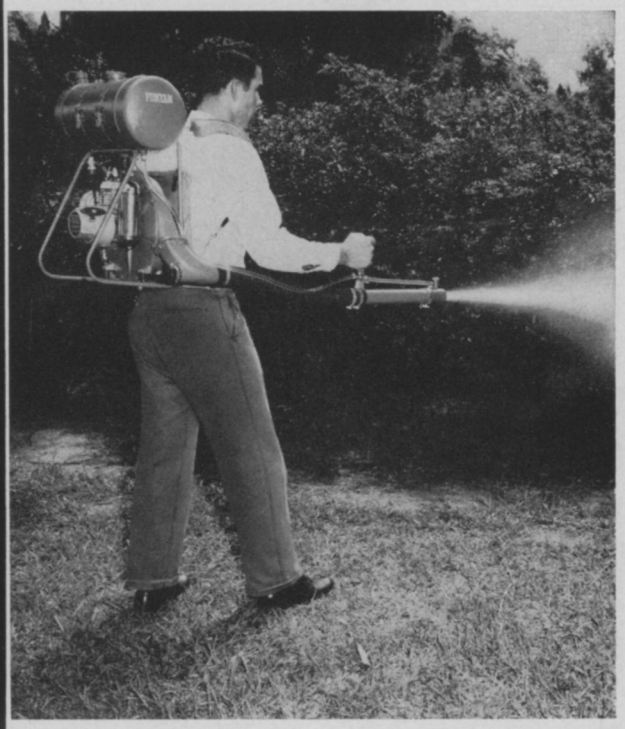

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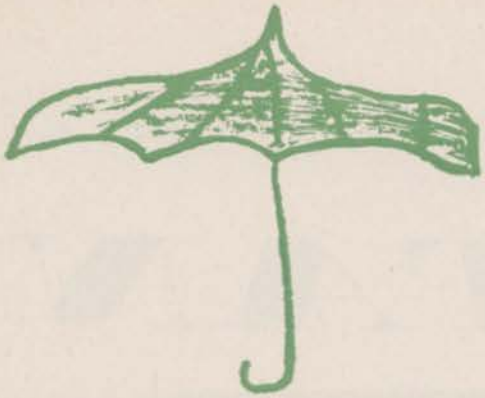

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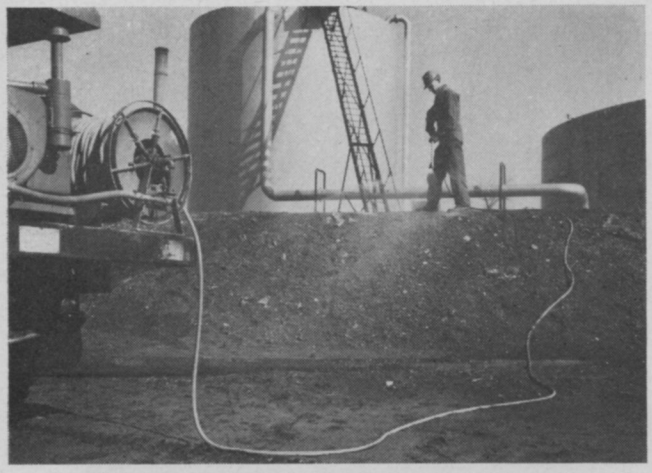


**Tank farms** make good business for weed controllers.

# SOIL STERILIZATION for weed control . . .

## *What it means — What chemicals to use — When to apply —*

SOIL sterilization consists of placing nonselective herbicides on or in the ground in such a manner that they will persist in the soil, clinging to soil particles so that both established plants and germinating seedlings will be killed.

This technique does not kill all life in the soil, in the normal sense of the word "sterile," but rather makes soil unfit for green plant life to survive. To be effective, an herbicide must be present so that no seedlings escape contact with it, or must be of such molecular structure that it is readily absorbed by developing seedlings.

Long-term sterilization herbicides are usually dependent upon rainfall or irrigation to leach or percolate the activated herbicide to that zone in the soil where it will affect the germination of seeds and kill established plants. Soil type interacts with herbicide solubility to affect the amount and speed of leaching. Light soils tend to hold herbicides less; heavy soils retain chemicals more readily. Light soils, however, are more easily treated because there are less microorganisms to act upon the herbicides.

Success of a soil sterilant herbicide is also dependent upon the ability of the compound to resist decomposition or breakdown by soil microorganisms, leaching, adsorption, chemical decomposition, and light deactivation.

Herbicidal compounds vary in their ability to sterilize soil. We will examine those compounds which are commonly used in what is termed industrial or noncropland soil sterilization after we examine the markets for this technique.

Most contract applicators are probably already aware of the potential market for soil sterilization. Industrial sites require semipermanent vegetation control when weeds become unsightly or interfere with safe operations. The oil industry, for example, engages contract applicators to control weeds on oil fields, around refineries, tank farms, and distributing and metering stations, so that fire hazard around flammable products will be reduced or eliminated.

Railroads, airfields, highways, power transmission lines, drainage canals, reservoirs, and other rights-of-way use weed control, including soil sterilization, to maintain unhampered and safe operations. Occasionally the food industry uses soil sterilization because less trouble from rodent predation results when adjacent weedy fields are cleared of weeds and accompanying rat harborages. Private and municipal recreational areas are using weed control, mostly selective, but sometimes a nonselective long-term type, to insure the comfort of patrons. See also *Weeds and Turf*, July 1962, page W-4, and August 1962, page W-4, for more market data.

Since a "weed" is defined as any plant growing where it is not wanted, any site where plants cause trouble should be treated by a professional CA well versed in the fine points of soil sterilization.

There is an apparent simplicity implied by fact that "chemicals are sprayed and weeds don't grow." Although this may be true to a degree, there are several variables the successful CA must know about in order to eliminate the possibility of failure and expense of re-treatment or injury to desirable plants nearby.

All herbicides interrelate with rainfall, temperature, soil texture, fertility, application date, weed species, and weed tolerance, to challenge the applicator and his arsenal of weed weapons.

These variables, of course, differ with each geographical region and local area, so they are too numerous to be individually explained

**Sidings and railway yards** are often contracted to professionals for weed control. Much of the "big mileage" railway work is let out, too.

here. Variables are in effect, however, in all regions, so that the alert CA will be able to relate these differences to his area and the chemicals he uses; matching this with his own experience, he will gain valuable insight into his profession.

Chemicals used for soil sterilization can be divided into two large categories: inorganic, those compounds not containing carbon; and organic, those with the element carbon in the molecule.

**Inorganic: Arsenic**

Arsenic trioxide, $As_2O_3$, is the natural compound, long known for its poisonous properties, by which toxicity of arsenic compounds is gauged; $As_2O_3$ is the active ingredient. Since this chemical is relatively insoluble in water, it can be applied only in granular form to weeded areas in regions of low rainfall, such as the West. It gives long-term vegetation control. At approximately 800 pounds active ingredient per acre, arsenic trioxide will give excellent control of annual weeds for several years. Arsenic trioxide is partly absorbed by stems and leaves; mainly it is leached by rainfall to root areas where it is absorbed by roots. When sufficient herbicide accumulates in the plant's tissues, it dies.

Sterilizing sandy soils with arsenic trioxide is most efficient because the chemical is more available to plants. Greater amounts of arsenic trioxide are needed for heavy soils with high humus or clay content. In regions of high rainfall the longevity of arsenic is decreased by microbial decomposition.

Sodium arsenite, $Na_2AsO_3$, is produced when arsenic trioxide is reacted with sodium hydroxide, NaOH(lye). Sodium arsenite is more water soluble than arsenic trioxide and can be applied in a spray form. It has had a wide use in both selective and nonselective terrestrial and aquatic weed control. Because of its mammalian toxicity, however, its usefulness is waning. Other herbicides will perform the same job more safely and efficiently.

**Inorganic: Sodium Chlorate**

Sodium chlorate, $NaClO_3$, is an effective soil sterilant with sufficient contact action to give foliage kill when applied as a spray. It is most useful for deep-rooted perennials, and is carried into the root zone by rain or leaching. If there is excess nitrate in the soil, killing action is reduced.

**Roadways inside industrial parks** must be kept weed free. This sprayman uses a truck-mounted boom for accessible, level areas; a small sprayer for the hard-to-reach slopes.

Therefore effective soil sterilization is dependent upon fertility of the soil. Excess nitrogen adversely affects the action and persistence of sodium chlorate in the soil, possibly because of the abundance of soil microorganisms.

Sodium chlorate is highly soluble in water which makes it possible to spray. A wetting agent or detergent increases its toxic action.

A drawback which makes this herbicide less desirable than others is that it is a powerful oxidizing agent and will ignite like a match if left to dry when on organic matter such as dry grass or clothing. It is said that the heat of the sun will ignite it. It is easy to extinguish with water but cannot be smothered because the chlorate carries with it its own oxygen in the molecule. There is no danger from pure or wet sodium chlorate. It will not burn or explode. Organic matter is necessary.

Compounds which absorb moisture, such as nonherbicidal calcium chlorate, are sometimes added to sodium chlorate to reduce this fire hazard. Borates are also combined with sodium chlorate for added protection against ignition. Sodium chlorate forms an essential part of such herbicide mixtures as "Chlorea," "Polyborchlorate," "Chlorax," and "Terratox."

**Inorganic: Boron Compounds**

Sodium borate, $Na_2B_4O_7$, is the anhydrous form (does not carry any $H_2O$ with its molecule) of borax. It is a slowly leached, nonflammable, noncorrosive compound with low toxicity, which can be applied only in dry form. Three to 12 pounds per 100 sq. ft. will give sterility. Since borax is slowly leached and is not affected by soil microorganisms, it lasts about one year in moist warm soils, the most adverse conditions for a soil sterilant. Repeat applications the following year can be halved to maintain control.

To get a sprayable form of borax, hydrated forms are used. Sodium tetraborate, $Na_2B_4O_7 \cdot 10H_2O$, is more soluble than the anhydrous form. Disodium octaborate, tetrahydrate, and sodium metaborate are usually mixed 3 to 1 with sodium chlorate and eliminate the fire hazard of the latter chemical.

Solubility of borates is influenced by hydration. Hydrated forms of sodium pentaborate and sodium metaborate all have their uses in combination with other herbicides such as monuron, sodium chlorate, 2,4-D, and polychlorobenzoic acids.

Toxicity of borate to plants is related to clay content or texture of soils, whereas previously discussed herbicides depended upon nutrient content or fertility. The more clay in a soil, the more difficult it is to get satisfactory results.

As mentioned previously, borate persistence in the soil apparently stems from the chemical's inherent

*This article was prepared by the technical staff of* Weeds and Turf, *and reviewed by major suppliers and university researchers.*

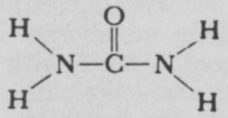
resistance to soil microorganisms which normally decompose or digest herbicides and make them nontoxic to plants. Additions of borates to other herbicides also increase their longevity in the soil, by inhibiting decomposition by soil organisms.

**Organic: Substituted Ureas**

There are four major substituted urea compounds, decreasing in solubility as follows: fenuron, monuron, diuron, and neburon. The two center compounds are selective herbicides commonly used at sufficiently high rates to act as nonselective chemicals and sterilize soils.

Fenuron, 3-phenyl-1,1-dimethylurea, is the most soluble of the four urea compounds. Its use is mainly for deep-rooted perennial and woody plant control. It is somewhat selective in this respect. We mention this compound because it illustrates how chemical researchers can work with a group of compounds and come up with several which appear to be similar, yet differ sufficiently to have slightly varied applications.

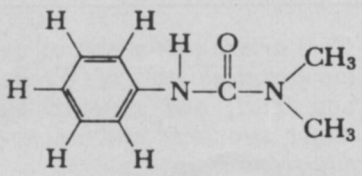
Urea is normally a nitrogen-furnishing fertilizer component. It looks like this:



urea

The C represents the element carbon; N, nitrogen; O, oxygen; and H, hydrogen. Lines between the atoms or elements represent the electrical bonds or links which hold the atoms together in a molecule.

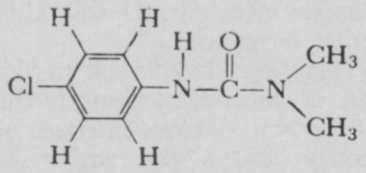
By a process known as substitution, chemists react urea, to which two methyl groups ($CH_3$) have already been substituted on the right end (1,1 position), with another chemical containing benzene, the hexagonal-shaped "phenyl" group. Researchers are thus able to produce a molecule where a phenyl group has replaced one atom of hydrogen. This is



fenuron

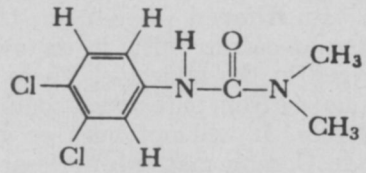
fenuron. The benzene ring which contains 1 carbon atom at each of the six corners and, normally 6 hydrogen atoms, is usually represented as an ordinary hexagon. The extra single lines also represent electrical bonds which hold the molecule together.

Monuron, 3-(4-chlorophenyl)-1,1-dimethylurea, is less soluble than fenuron. Ten to 50 pounds of active monuron per acre will control must vegetation. Monuron, like the rest of the substituted urea compounds, has a built-in resistance to decomposition under normal conditions. "Mono-" refers to the substitution of one chlorine atom on the phenyl group. The monuron molecule looks like this:



monuron

Diuron, 3-(3,4-dichlorophenyl)-1,1-dimethylurea, has the substitution of 2 atoms of chlorine; thus di-uron. It is even less water soluble than monuron. For this reason, it is preferred for soil sterilization at about 10 to 50 pounds active per acre in areas where there is more rainfall, and light sandy soils because it leaches less readily. Following the chemical substitution reaction, the original urea molecule has been transformed to:



diuron

Both monuron and diuron are absorbed by roots and are translocated to all parts of plants. Research indicates that the substituted ureas interfere with photosynthesis. Some workers feel that these herbicides prevent release of oxygen. This is a partial explanation of what causes death of weeds with substituted urea compounds.

**Organic: 2,4-D Type Compounds**

Fenac, 2,3,6-trichlorophenylacetic acid, is a growth regulator like 2,4-D, but is proving to be a longer lasting herbicide with special uses against perennial weeds.

Fenac is dependent upon rainfall for distribution throughout the soil where it has a contact effect on roots and germinating seedlings. Although it is one of the more persistent of the 2,4-D types, it requires repeated application for complete vegetation control. Rates of 15 to 30 pounds per acre will give soil sterilization.

Erbon, 2-(2,4,5-trichlorophenoxy)ethyl 2,2-dichloropropionate, is one example of organic synthesis where the molecules of two efficient weed killers, 2,4,5-T and dalapon, are combined into one large molecule with soil sterilant properties. Erbon is only slightly soluble in water and is available as an emulsion for use in water, or it can be applied in oil.

Applied as a spray at rates of 120 to 160 pounds of active ingredient per acre, it will eliminate all vegetation, and give extended control of germinating seeds.

Erbon does not move laterally on the soil as much as most herbicides and thus can be used with greater safety on smaller areas such as driveways around lawns where desirable vegetation is growing nearby.

Chlorobenzoic acids such as TBA, 2,3,6-trichlorobenzoic acid, and PBA, polychlorobenzoic acid, are effective soil sterilants at rates of 15 to 30 pounds per acre and 30 to 60 pounds per acre respectively.

They are especially effective against deep-rooted perennial weeds at these high rates.

TBA is the most potent of the possible chlorine-substituted benzoic acids. Depth of penetration depends upon rainfall and soil type, but the chlorobenzoics are persistent in the soil.

The same precautions must be taken when using these materials as with 2,4-D, namely avoidance of drift, and caution regarding the proximity to desirable species.

Tritac, 2,3,6-trichlorobenzyloxypropanol, is a new nonselective herbicide that will be available for the first time this season. Again the "2,3,6- trichlor" configuration should be noted. It is being recommended for deep-rooted perennials and will provide complete vegetation control at rates of 10 to

(*Continued on page W-30*)

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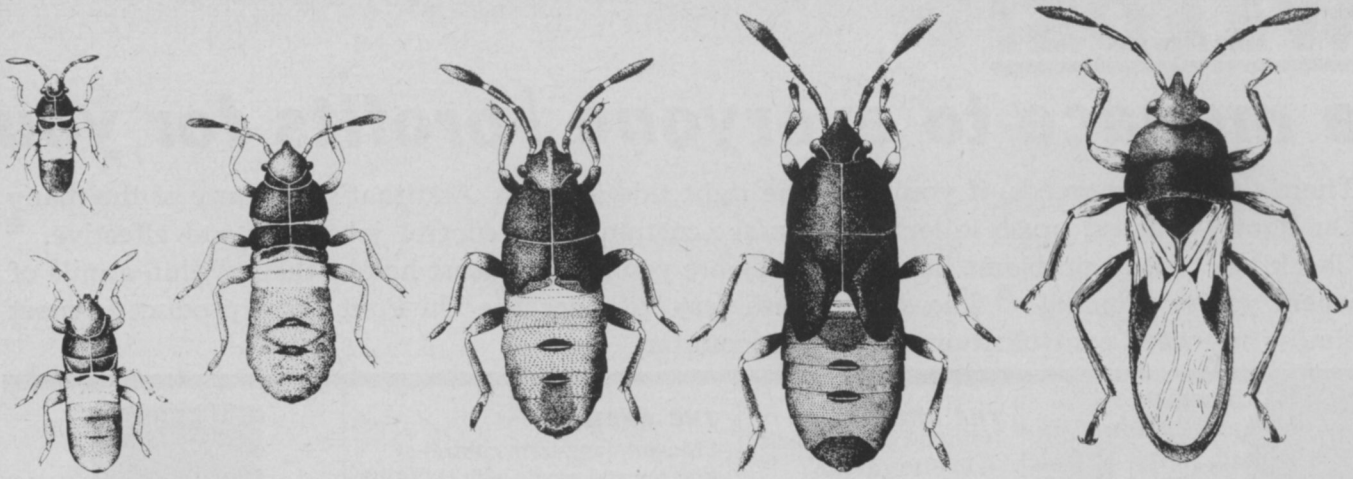


**How the chinch bug develops.** Note gradual loss of immature white band through growth of wing pads. Each stage gets darker, from original nymphal red to adult black. Nymphs are most damaging.

# How to Identify and Control Insect Pests in Turf

## Part 2

*This is the conclusion of an original research article prepared by the technical staff of* Weeds and Turf, *in cooperation with state experiment stations around the country. Part I, which appeared last month, discussed basic principles of insect control in turf, and dealt specifically with beetle grubs, miscellaneous beetles, and sod webworms. Ed.*

### Other Moth Lawn Pests

Family Phalaenidae of the moth and butterfly order foster a number of agricultural and horticultural pests known collectively as cutworms.

Armyworms are very destructive and widespread larval moths of the cutworm family. Adults are pale brown to buff, night flying, nectar feeders, with one small white spot in the center of each front wing. The species designation *unipuncta*, meaning "one spot", is one way of remembering this pest, *Pseudaletia unipuncta* (Haworth).

**Chinch bugs reveal themselves** by floating to top of water in bottomless can which has been inserted into edge of infested area and filled

Wingspread is about 1½ inches. Females lay eggs, from 25 to 100, in folds and under grass leaves. One female may lay as many as 2,000 eggs a season. Small greenish larvae hatch in about 10 days. Maturation takes 3 to 4 weeks; greenish brown, longitudinally striped larvae, 1½ inches long, pupate and emerge as adults after 12 to 14 days pupation. There may be 3 broods a year in northern states; in the South, different life stages can be found in soil year around.

Larvae hide in litter on the soil and in crowns of plants during daytime. Night and evening (and cloudy day) feeding results in grasses being chewed off completely. When food supplies are exhausted in one area, armyworms band together and march off to greener pastures. From this habit they get their common name.

Recommended control chemicals are chlordane, dieldrin, heptachlor, toxaphene, DDT, and Sevin. Chlordane, dieldrin, and heptachlor follow sod webworm dosages (⅓ pound active ingredient dieldrin or heptachlor per 5000 square feet; 9 ounces active chlordane per 5000 square feet). Sevin is applied in both the North and South at 1 pound active per 5000 square feet.

Toxaphene and DDT are the main munitions against the fall armyworm, *Laphygma frugiperda* (Smith), in Florida. This species, often called the green grassworm, is more bothersome and more frequently encountered on cultivated turf.

Larvae of fall armyworms resemble true armyworms but have a prominent inverted white "Y" on the front of the head, and longer hairs arising from black tubercles on the back. On the true armyworm, these spots and hairs are less conspicuous. Adults have dark-gray mottled forewings and grayish-white hindwings. In habits and life cycle, the fall armyworm resembles the true armyworm. Toxaphene and DDT are applied at the same rates as prescribed for sod webworms.

A number of additional species in the family Phalaenidae are capable of doing extensive damage to turf. These are cutworms.

Professor Andrew S. Deal, of the University of California at Riverside, told *Weeds and Turf*: "Cutworms have been more prevalent in dichondra lawns (a favorite in southern California) during the past five years than they were previously. Many lawns have been damaged before the owners realized that cutworms were present."

Cutworms are similar in form and size to the moth species described previously; they differ mainly in coloration and pattern-

ing. Other members of the family are called loopers and underwings. Chemical control measures are the same as for armyworms. Control on dichondra lawns is best using DDT or toxaphene. The same pyrethrum test may be made for all Phalaenids, and chemicals should be applied in late afternoon, if possible, because insecticides will then have greatest effectiveness against these night feeders.

**Chinch Bugs**

The chinch bug is the greatest offender among those insects which suck plant juice. Nymphs, which account for greatest damage, are colored a bright red with a white band across the back. Infested areas show up as brown dead areas, sometimes just a foot or two in diameter. If left unchecked, a whole lawn may be destroyed. In the North, bentgrass is most susceptible; in the South, St. Augustine is damaged most heavily.

As nymphs mature they become darker in color; development takes 30 to 40 days. Adults are 1/6 to 1/5 inch long (not as long as some blades of grass are wide) and black. Each white wing cover is marked with a black triangle on its outer margin. Some of the immature red coloration is retained on the legs.

At least two forms of chinch bug are bothersome in United States. The hairy chinch bug, *Blissus leucopterus hirtus* (Montandon), a short-winged form, is a pest in the northeastern states, while *Blissus leucopterus insularis* (Smith), the lawn chinch bug, is prominent and damaging in the South. *B. leucopterus*, although distributed throughout the Mississippi Basin, is not listed as a turf pest by Indiana, Kansas, or Iowa, nor is its damage accounted in California and other states west of the Rocky Mountains.

"The lawn chinch bug is acknowledged by entomologists to be the major turf pest in all the Gulf States except Texas," reports Professor Kerr from Florida. He further states that the chinch bug is "evidently resistant to DDT in much of Florida and to parathion in some 'hot spots.' Other organic phosphorous insecticides and carbamates can control these populations."

When asked about insect resistance, Professor Milton G. Savos of the University of Connecticut at Storrs replied to *Weeds and Turf* that in his area controllers have encountered "no problem with resistance with the possible exception of the chinch bug to chlordane, dieldrin and DDT."

In Florida, in addition to chlordane, dieldrin is ineffective against *B. leucopterus insularis*, according to Professor Kerr.

Chemicals usually recommended in the Northeast for chinch bugs are chlordane at 1¼ pounds active, diazinon at 7½ ounces active, dieldrin at ⅓ pound active, and Sevin at 1 pound active, all per 5000 square feet,

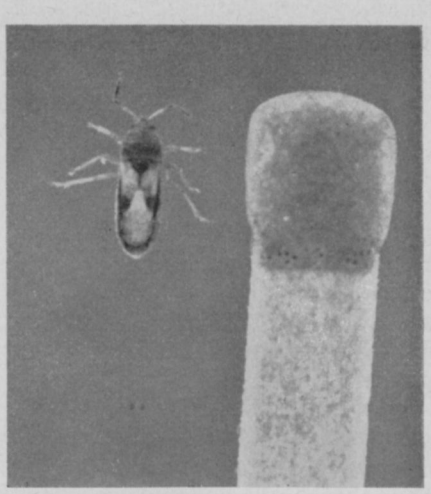
Munitions used against *B. l. insularis* in Florida's program are parathion, from 2 to 4 pounds active ingredient per acre; diazinon, from 4 to 8 pounds active per acre; V-C 13, maximum of 3 pounds active per 5000 square feet; Trithion, at 12 ounces active per 5000 square feet; and Ethion, at about 1 pound active chemical per 5000 square feet. The most recent addition to recommendations for Florida spraymen is ASP-51 (Stauffer), to be used at 10 pounds active ingredient per acre.

Although Zytron, the pre-emergence crabgrass killer, has not yet been registered for insect control, tests have shown it effective against chinch bugs in Alabama.

**Easy Chinch Bug Test**

In order to make a proper diagnosis of a lawn ailment, a test similar to that mentioned for webworms and cutworms should be made. To make this test, cut both ends out of a large can (a 2 pound shortening can will do). Force this can into the soil 2 to 3 inches deep at the edge of an area which appears to be damaged. Fill the can with water and wait about five minutes (you may have to add more water). If chinch bugs are there, they will float to the top of the water and can be positively identified. In addition to identifiable body characteristics, chinch bugs give off a vile odor when crushed.

As a postscript on chinch bugs, it should be mentioned that fertilization with soluble nitrogen may assist chinch bug development just as it assists grass



**Size of adult chinch bug** as compared to paper match head. Adult chinch bug is 1/5 inch long.

development. Workers in Florida suggest that heavy nitrogen fertilization be held up until fall to discourage chinch bug population explosions.

**Other Lawn Pests**

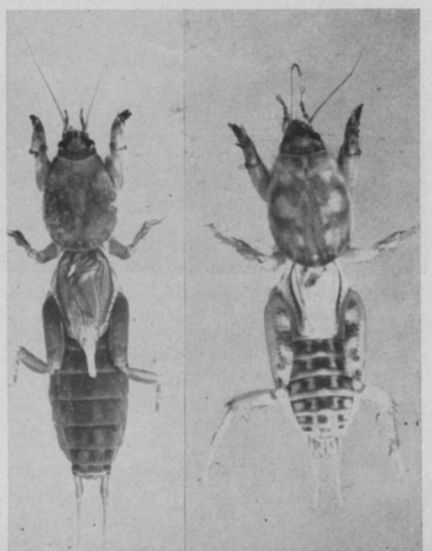
Clover mites (Tetranychidae) may inhabit lawns in some areas where there is plenty of moisture in the soil. Mites are usually noticed by homeowners when they move indoors during cooler weather. Someone reporting mites would probably describe them as "small, moving red spots." They are typically less than 1/30 inch long, and red.

According to a bulletin prepared by Dr. Harold Gunderson of Iowa State University: "On approach of cold weather . . . it is the search for protective sites for oviposition, molting, and hibernation that leads clover mites to accidently enter buildings and become a nuisance."

Removal of an 18-inch strip of grass around the foundation (if

(*Continued on page W-26*)

**Immature mole crickets** of the genus Scapteriscus do just as much damage as adults. Note reduced wings, naked abdomen, expanded front legs and broad thorax which houses powerful digging muscles.



# "Record Attendance at 16th Southern Conference Proves Industry Growth," Holstun Tells Weedmen Gathered in Mobile, Jan. 16-18

"This all-time attendance record is an excellent example of the remarkable growth of the weed control industry," Dr. J. T. Holstun, president of the Southern Weed Conference, enthused at the group's 16th annual conference.

A precedent-setting 600 delegates flocked to the Admiral Semmes Hotel in Mobile, Ala., for the three-day convention, Jan. 16-18. Speakers from 26 states presented some 115 papers, covering research and developments in all phases of weed control. All sections of the nation and the industry were represented; Hawaii was the most distant state from which applicators traveled.

H. E. Rea, associate professor at the A & M College of Texas, College Station, reported Banvel D experiments on various broadleaf species, tested in the fall of 1961 and spring of 1962.

Analyzing results on a dense stand of second growth curly dock, treated at 3, 6, 9, and 12 lb., in 150 gallons of water per acre, Rea told the weedmen that top kill was complete in 10 days, except for a 2% survival following the 3 lb. treatment. Moderate resprouting and general reinfestation from seedlings occurred in less than 5 months on the 3 and 6 lb. plats. "No sprouts and only sparse seedling emergence occurred on the other plats," Rea revealed.

Noting the importance of climatic conditions, Rea told delegates that when collars of trumpet creepers were drenched with 8 lbs./100 gal. water of Banval D, treatment was not effective until a rainfall, several weeks later. "When the rains came, the tops of most of the trumpet creepers died," Rea reported. "However, considerable resprouting from surviving roots occurred before the end of the season."

Top of silverleaf nightshades were killed with a semibroadcast application of 16 lb./100 gal. Banval D, and within 6 weeks soil in the treated spots was bare.

### Smutgrass, Mugwort Reviewed

Smutgrass has become a serious invader of improved pastures in peninsular Florida, scientists from that state's Agricultural Experiment Station warned weedmen at the conference.

In studies made in Ona, Fla., agmen found that dalapon, a water-soluble herbicide, will kill 85% or more of the unwelcome grass. An overall application of 5 lbs. per acre or 5 lbs. active/100 gallons of water for spot treatment were both found to be effective.

"Mugwort is a vulgar little plant that has incurred the displeasure of all of us," Dr. S. W. Bingham, Virginia Polytechnic Institute's plant pathology and physiology department member, said in introducing his subject.

Most promising controls, from tests of 25 chemicals and chemical solutions, are Fenac and Banval D, Bingham disclosed. "Used in the early stages of growth, a single treatment of either gave very good control not only of roots, but of underground stems as well," Bingham concluded.

### 2,4,5-T Control Effectiveness

"Newer chemicals have come along, but 2,4,5-T is still the standard control for woody plants," John P. Sterrett, of the Virginia Polytechnic Institute department of plant pathology and physiology, affirmed.

Two most common measures are the stem broadcast method, where all stems and branches are sprayed with a special effort made to cover the root collar, and broadcast basal method, covering the lower one-third of each main stem and root collar.

"Year-round spraying is thus possible," Sterrett claims, "and reduces cost of labor and equipment, although these methods cost about the same as summer foliage applications." Spraying in areas where susceptible crops are grown is feasible because spraying can be done before most crops are planted, Sterrett advises.

Although both methods are about equally effective, the lower chemical and labor cost of the broadcast basal method tend to make it more desirable in most operations, the researcher concludes.

"Oils alone, and the same oils in water emulsion, were practically equal in effectiveness as diluents for 2,4,5-T herbicide that was aerial-sprayed," Harry M. Elwell, research agronomist with the Oklahoma agricultural experiment station, revealed to the more than 600 weed and turf specialists.

"Although there was little measurable difference between oil alone and the same oil in emulsion form, there was a trend of greater defoliation with oil only," Elwell determined, and noted that the same trend has been reported by other researchers conducting brush control tests, under somewhat different conditions, in other states.

"Other sprayer components exist

**Outgoing president** of the Southern Weed Control Conference, Dr. John T. Holstun, extreme right, told newly elected officers of their responsibilities. Shown (l to r) are: president-elect R. F. Richards, Geigy Chemical Co., Orlando, Fla.; vice president R. E. Frans, University of Arkansas, Fayetteville; and secretary-treasurer Henry Andrews, University of Tennessee, Knoxville.

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**First scholarship recipients,** receiving awards from Dr. John Baker, Louisiana State University, chairman of the Conference Student Interest Committee, were (l to r): H. R. Bayless, University of Tennessee, third place winner; A. B. Rogerson, second place winner from Virginia Polytechnic Institute; and N. D. Camper, North Carolina State University student who received the $500 first place award in the essay contest.

only that the nozzles may be operated properly," Glenn C. Klingman, North Carolina State College, Raleigh, stated forcefully in his account of an "ideal" nozzle.

Many alleged *herbicide* failures are actually *equipment* failures, Klingman believes. In describing the "ideal" nozzle, he noted that it would apply the spray:

— uniformly under usual operating conditions;

— with little or no spray drift;

— at a low gallonage per acre when uniformity of application is the only need;

— with clogging reduced to a minimum;

— at low pressures to reduce spray drift, reduce pump wear, and cost of hoses required; and

— resist both chemical and abrasive corrosion, maintaining spray pattern and rate of discharge over extended periods of operation.

"These requirements can now be met with hollow cone, 'whirljet,' or 'nonclog' nozzles," Klingman concluded, "that have spray angles varying from 50° to 130°."

Recent observations of soil treated with herbicides and stored at various controlled temperatures revealed that effectiveness of the herbicides decreased with the warmer temperatures, Florida Agricultural Experiment Station scientists reported.

Under summer field conditions, researchers disclosed that herbicides tested were inactivated in less than seven weeks. This was not the case, however, in the winter or spring when temperatures were low.

Tennessee Valley Authority spokesmen D. C. Francisco and J. R. Aldred, Chattanooga, Tenn., confirmed this theory when they advised spraymen to apply soil sterilants in April or May.

Although various formulations of 2,4-D and related hormone-type herbicides have become the most generally accepted means of killing roadside vegetation, there are many factors which limit the use of these controls, U.S. Borax's V. W. Woestemeyer, research agronomist, informed the weedmen.

Handicaps include the several species that cannot be controlled with this type of herbicide, resprouting of many weeds and the susceptibility of adjacent crops and ornamental plants to damage from drift or volatility, Woestemeyer explained.

"The most promising material U.S. Borax is presently investigating is a product containing 8% trichlorobenzoic acid," Woestemeyer related.

Optimum range in application rates was 275 to 400 lbs. per acre. Initial symptoms of toxicity resulting from treatments consisted of damage to the foliage or complete defoliation, Woestemeyer claims. In some cases, defoliation was followed by the emergence of new foliage exhibiting severe toxicity symptoms.

"There is no doubt that chemicals provide the most desirable right-of-way control," James F. Jones, maintenance supervisor for First Electric Cooperative Corp., Jacksonville, Ark., told conference delegates.

In comparing chemical control methods with hand clearing and bulldozing operations, all of which First Electric utilizes to maintain its 3,100 miles of electric distribution lines, Jones concluded:

"Records and statistics to date show that chemical control, where applicable, is by far the most desirable method to use from both the economical and effective standpoint. But my experience indicates that no one method will meet all requirements. Methods should be adapted to local conditions."

"Original stump treatment in 1954 resulted in an 81% kill," R. A. Mann, from the TVA, disclosed in his discussion of stump treatment methods on rights-of-way for the Tennessee Valley Authority. "Cost then was $57 per acre, but in the last 5 years we've treated more than 12,500 acres, with an average cost of $65 per acre.

"So far, the lines we've treated have not needed any re-treatment for at least 3 years," Mann concluded.

**"Air Blast" Sprayer Improves RR Right-of-Way Weed Control**

A specially designed air blast sprayer, resembling an orchard mist blower, is being successfully used by the Illinois Central Railroad, D. H. Yazell told conference attendants.

F. E. Myers & Bro. Co. manufactured the machine for the Industrial Herbicides Corp., Memphis, Tenn. The device is powered by a fan driven at about 1,600 rpm by a 4-cylinder air-cooled engine, operating at close to 2,000 rpm.

"Initial air blast velocity is about 115 mph," Yazell pointed out, "but the force is almost completely dissipated within 80 to 90 ft."

Nozzles in front of the spray bonnet direct the mixture into the air blast at pressures up to 50 lbs. per sq. inch, Yazell disclosed. Solenoids, controlled by electrical switches, operate air-actuated valves which open and close material valves leading to the nozzles.

"Pressure is controlled by an air-motor control on the throttle, through an automatic pressure control device," Yazell revealed. Machine, installed on a regular Illinois Central brush spray car, is equipped with a speedometer, and speed is closely checked from both the engines and the spray car. Directions are relayed to the engines by radio.

"In one of our first test runs, we found that nearly all the leaves, stems, and branches in the sprayed swath were completely covered," Yazell reported. Moreover, experience confirms that the design

(*Continued on page 29*)

# TURF:

## One application of dieldrin controls major turf pests for an entire season

**Dieldrin controls soil insects such as Japanese beetle grubs, white grubs, sod webworms and ants. These insects feed on grass roots, cut off nourishment and moisture and cause browning and bare spots.**

**Dieldrin also controls annoying, health endangering surface pests such as ticks, fleas and chiggers. Here are the details.**

Now is the time to size up your turf insects problem and do something about it.

If you cannot start healthy, vigorous grass growing in certain areas, or if you have bare patches, soil insects could be the cause.

Turn up some sod in these trouble spots and sift through the dirt. See if you don't find grubs or some other evidence of soil insects.

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Dieldrin can be applied in a number of ways. It can be sprayed on as a liquid or applied in granular form with a fertilizer spreader. Dieldrin is also available in fertilizer mixtures. This lets you combine the two operations and saves time and money.

### Controls ticks, fleas and chiggers, too

Dieldrin also controls ticks, fleas and chiggers. These pests are not only annoying, but also are public health problems.

In addition to applying dieldrin to turf, to get maximum control of these above-ground pests, treat weeds, the ground around low-growing shrubs and buildings—anywhere these pests might take refuge.

### Where to get dieldrin

Dieldrin is available from your local insecticide dealer under many well-known brand names. Accept no substitute. Check the label or the ingredient statement on the formulation you buy for the name *dieldrin*.

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**Control all these turf pests with dieldrin**

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| Green June beetle grubs | Sod webworm |
| White grubs | Armyworms |
| Northern masked chafer grubs | Sowbugs |
| | Pillbugs |
| Asiatic garden beetle grubs | Snails |
| Oriental beetle grubs | Wireworms |
| Japanese beetle grubs | Root maggots |
| Earwigs | Slugs |
| Ants | Chiggers |
| Striped grassworm | Fleas |
| Mole crickets | Ticks |

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# California Weedmen Focus on Application at 15th Annual Conference in Santa Barbara

By VINCENT H. SCHWEERS

Farm Advisor, University of California Agricultural Extension Service, Visalia

A welcome note of practicality which weedmen can put to work in the field highlighted the 15th Annual California Weed Conference, Santa Barbara, Calif., Jan. 22-24.

Sponsored by the University of California, the State Department of Agriculture, and participating chemical manufacturers, the conference drew 455 registrants. Many of these, both in the audience and on the podium, were contract applicators.

This "down-to-earth" character was proclaimed by conference president Charles C. Siebe, who said in his keynote address that he hoped the annual assembly would prompt delegates to new accomplishments in applied weed control.

A formidable array of talks followed, including sessions on vacant lot weed control, choice of spray equipment, new methods in brush control, and a special seminar on "What's new in weed control chemicals."

### City Vacant Lot Program

Contract applicator Ron Burk, Chem-trol Company of Arlington, California, discussed the vacant lot program in his area.

One of the main problems, he said, is that city ordinances often prohibit the application of chemicals or sprays in the city. Sprays have advantages over discing or burning because they eliminate dust and smoke.

Contract applicators must contact the lot owner directly to sell the chemical treatment. The city burns or discs the weeds when they feel they are a hazard, and adds the cost to the taxes on the lot.

Combinations of chemicals are usually used on the lots sprayed. Usually chemicals are applied as a yearly maintenance treatment. Two pounds of atrazine and two gallons of trichlorobenzoic acid per acre has given good control, Burk said. When weeds are present, 2 lbs. of Amitrole is added as a knockdown treatment.

If weeds are established, after the usual rainy season is over, sprays of 7 to 8 lbs. dalapon plus 1 qt. of 2,4-D per acre are used with good results. Weed oil, or Amitrole, is used where 2,4-D is not safe and where the oil stains are not objectional, the Californian elaborated.

On lots, industrial sites, or open areas where longer control is desired, Burk said he uses 4 to 5 lbs. of Simazine and 2 gallons of Fenac per acre.

There is no one-shot weedkiller for ornamentals to do all the jobs desired, John Smith, State Division of Highways, Los Angeles, told the conference.

Procedures used today may be ineffective on the next time around and may need to be modified to maintain weed-free areas, Smith said. Often combinations have shown terrific results when applied at the correct time, but have been failures at other times.

Improper applications can result in destruction of desirable plant life, damage from erosion, and financial loss as well as loss of material, time, and man power. The continual use of one chemical often allows tolerant weeds to exist.

It is necessary to understand the basic idea of such plantings to consider weed control in ornamentals. Plants are in close proximity to shade the ground quickly, thereby reducing weed growth and moisture evaporation. Weed control problems predominate during the first few years of such plantings, hence the problem is primarily among young plants.

Spray shields are a must, but damage has resulted when some materials leach into the root zone of plants, or move on the surface in free water, causing concentration of the chemical in basins of new plants, resulting in damage to the plants.

Weed oil has been extensively used as a comparatively safe material, but young acacia plants and other related legumacea species have become chlorotic due to concentration of the oil in the basins. The discoloration of vegetation, painted surfaces, and fences has evoked complaints and criticism. The aromatics are a problem in heavily populated areas, Smith continued.

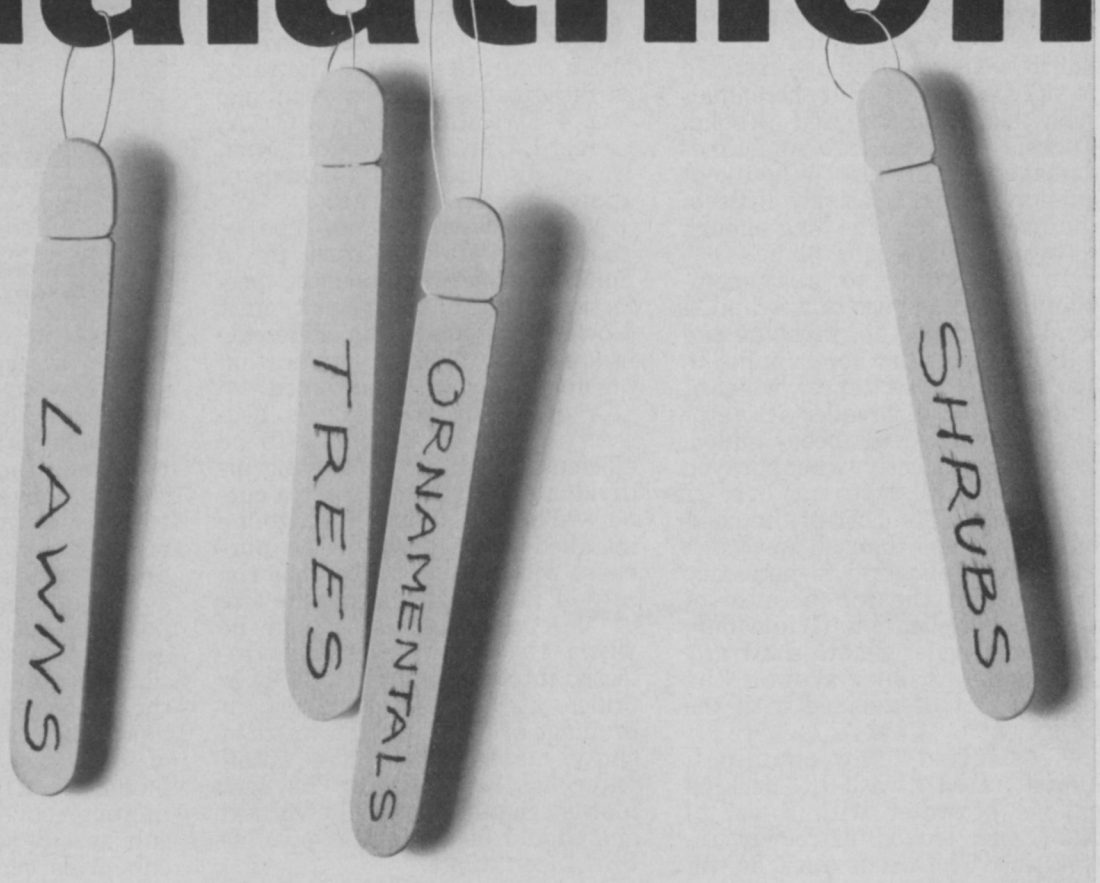
Dalapon applied to grasses, especially Bermuda and Johnsongrass, in the early growing season has shown less than 20% effective control, whereas when applied in late fall, prior to the first frosts, has been approximately 80% effective. Early applications are made to discourage growth of Bermuda and Johnsongrass without thought of eradication.

Amitrole has been used primarily as a knockdown in extremely wet areas and has been erratic in results, the highway official claimed.

Smith said the amine formulation of 2,4-D is the safest of the

**Officers of the California Conference** (left to right): Outgoing President Charles Siebe, State Department of Agriculture, with new officers Vice President Jim Dewlen, Amchem Products Co.; President William Hopkins, Best Fertilizer Co.; Secretary Norman Akesson, University of California, Engineer; Treasurer Cecil Pratt, State Department of Agriculture. The Robbins Memorial hoe passes as a trophy to each new President.

# Malathion

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NIAGARA CHEMICAL DIVISION
MIDDLEPORT, N. Y.

2,4-D family for control of stubborn broadleaved weeds. But in any case caution must be taken to keep the material off desirable vegetation, as damage can result from strong wind drift or breezes created by passing vehicles.

Simazine at 2 to 5 lbs. of active material per acre has proven effective as a pre-emergence control, Smith went on. Damage resulted to only a few delicate perennials such as Xylosma and Abelia. Fuchsia and roses are sometimes damaged at this rate. When kept outside basins, relatively little of the material remains long enough to injure the growing plant.

In attempting to allay complaints from the use of weed oil, a combination of 1 lb. simazine and 1 lb. Amitrole per acre, applied in 100 gallons of water to which 1 pint of X-77, a spreader activator for spraying, had been added, proved very effective when sprayed on weeds of all types not over 12 inches high. The cost of the combination is less than oil sprays. A touchup application is necessary to complete the job because of sporadic application. While only the very tender plants show any symptoms, basins around the plants must be avoided with the treatment.

A relatively new chemical, Diquat, used at a 1 qt. per 100 gallons of water with 8 oz. of X-77, has looked extremely interesting. The weeds must be wet with the spray to obtain good results. A full-cone nozzle with 60 lbs. pressure gave excellent results when complete coverage was obtained.

**A self-propelled sprayer** was exhibited at the California Weed Conference. Note the raised, hooded boom for treating under the skirts of tree crops to prevent spray drift. The rear-mounted motor propels the sprayer, drives the pump, and agitates the 400-gallon tank.

Smith is still looking for one material that will do all things he wants done in one application.

### Discuss New Application Techniques in Brush Control

New methods and techniques for controlling brush are constantly being tried; however, in spite of this, the main chemicals used for brush control today are the same as those being used ten years ago —2,4-D and 2,4,5-T. O. A. Leonard, University of California, Davis, discussed new methods of applying these chemicals.

Mist blowers of one type or another have been used for a number of years; however, perfection of the backpack mist blowers has made the widescale use of this type of application possible, Leonard maintained.

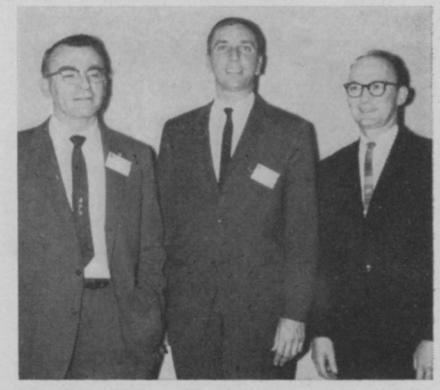
A quick cutoff valve is necessary if the equipment is to be efficiently used for controlling individual woody plants; such a cutoff valve will likely have to be installed. It is desirable to purchase a mist blower that has the rate of flow governed by the size of the orifice, which should be where the spray material is released into the airstream. A large orifice at this point results in drainage of the line and a waste of spray material after the cutoff valve has been closed. The mist blower should be easily carried and should be as light as possible to reduce fatigue.

Backpack mist blowers can be used to control woody plants by individual plant treatment. This type of treatment is necessary in order to control hard-to-kill species such as live oak. The sprays should be quickly applied, but a serious attempt should be made to get some spray on all parts of the plant, including the parts closest to the ground.

It is generally necessary to walk around each clump of sprouts in order to make the best application.

A spray mixture advocated is one in which a very minimum of diluent is used, since this represents weight which must be carried around. One such mixture used by Leonard consists of 1 part commercial brush killer to 3 parts diluent. The diluent consisted of equal parts of water and diesel fuel. Whether this is the best mixture remains to be seen, but it has been satisfactory for some purposes.

Backpack mist blowers can be used for broadcast spraying of brush-covered areas. Best results can be obtained following a fire



**Suppliers who told of new products** in the session, "What's new in Weed Control," included (left to right): Jim Wilkerson of U.S. Rubber, Naugatuck Chemical Division; Robert Orlik, Jr., Diamond Alkali Company; Joe Antognini, Stauffer Chemical Company.

because the main obstructions in the way of securing good broadcast spray coverage have been removed by the fire. The small brush sprouts and seedlings can be easily sprayed by directing the spray blast slightly above them. It is possible to cover a swath width of 20 feet, walking at a convenient speed of about 2 miles per hour.

Continuous application is not possible, but an appreciable area can be treated in a day on accessible terrain. It is best to make the applications with the wind as much as possible. In the process of broadcast spraying, one can pause briefly to give a more thorough coverage to isolated difficult species such as live or black oak. This type of treatment has given excellent control of regrowth chamise and regrowth bearmat, applied the first year following a fire.

Live oak sprouts can be controlled with 25% Fenuron pellets, Leonard continued. At present it seems that two or three ounces of pellets must be applied at the very base of each group of stems. A large live oak clump might have several such stem units, requiring a total of perhaps a pound. On areas where live oak is scattered but a problem, Fenuron might be the most feasible method of control. The treatment is most effective on sandy soils. The pellets should be applied in December under California conditions. It may take two or more years for the live oak to die, the scientist warned.

Cut-surface application of chemicals for controlling trees is not new, but there have been some new devices produced for making the applications. The older method consisted of making the cut with a heavy hatchet and then applying the chemical to the cut using

a pump-type oil can. There is nothing wrong with this method and there is much that can be said in its favor, although the newer application devices have points in their favor too, Leonard predicted.

One device has been to modify the blade of the hatchet or ax so that a better cup is made for holding the chemical.

The more popular devices for applying chemical to cuts in trees are injection tools. One of the more popular of these is the Reuel Little Tree Injector. Fluid is injected following the production of a cut by impact of the bit against the tree. The injection of the fluid is manually controlled so that quantity applied can be varied according to the requirements and the desire of the operator. Other types of tools are available that automatically inject the fluid into the cuts following impact of the injector against the tree. Results with this type of injector have been more erratic, especially in stands of mixed species of trees.

**Substituted Urea Surfactant**

For almost a decade now the class of compounds known as the substituted urea herbicides has been widely accepted and used as soil treatments for controlling weeds through root absorption. To introduce a chemical herbicide into the plant through the soil and roots is a very complex procedure, which often requires a much heavier rate of application than would seem to be necessary if one could inject the chemical directly in the plant, M. C. Swingle, E. I. duPont de Nemours and Company, told the California weedmen.

One of the more interesting developments to come into the weed control picture in the past few years is the discovery that a surfactant, or wetting agent, can greatly accelerate the absorption of a soil sterilant type herbicide such as Karmex diuron weedkiller by the foliage of a plant.

The key apparently is the nature of the surfactant and the quantity used. Such a spray not only lays down a residue on the soil to control seedling annual weeds, but also kills emerged weeds by contact during application.

Initial work on both annual and perennial weeds demonstrated that the foliage of almost any species could be severely burned or killed by suitable dilutions of Karmax and surfactant, according to Swingle. Species known to be extremely resistant to Karmex by soil applications were readily injured by diuron - surfactant spray.

Most of the work on the West Coast using Karmex plus surfactant has been initiated only this past summer, the duPont spokesman continued. Sufficient time has not elapsed to fully evaluate the degree of supression or kill of many perennial weeds.

Herb Chandler, Deputy Agricultural Commissioner from Yolo County, described some of the results he has had using Karmex and X-77. Karmex plus X-77 gave excellent control of such weeds as Bermudagrass, puncture vine, dock, watergrass, and Johnsongrass in trials conducted in 1961. Since Johnsongrass is a serious pest, it was interesting to note the results of the trial. The Johnsongrass was growing on top of an irrigation levee approximately 20 ft. from the water's edge. The four-in-one combination, 4 lbs. of Karmex plus 1 gallon of X-77 in 100 gallons of water, was applied on May 1 to the Johnsongrass. The plants were wet to runoff.

Three months later only a few

clumps of Johnsongrass were visible. After the application, very little action was visible for the first seven days. Then a slow and gradual dying of the foliage was noticed. This dying continued from five to seven weeks after the spray treatment. A second treatment at the end of this period gave the outstanding results at three months, Chandler claims.

A trial in 1962 has confirmed some of the results. An irrigation ditch was selected that had one bank next to an alfalfa field where the grower cut the weeds on this bank regularly; the opposite bank was next to a fence so that the Johnsongrass had not been disturbed and was about 6 ft. tall in full seed head. The bank that had been cut was 12 to 18 inches tall at the time of treatment. This afforded two stages of Johnsongrass growth. The ditch banks were sprayed on August 15.

In evaluating the results of the spray, it was agreed that the tall grass had suffered 60 to 75% mortality from the first spraying. Seven weeks later the bank that had the tall growth was spot-treated for regrowth and the other bank was sprayed solid. Ten days after the second application and until December 9th, the day of the first frost, no regrowth was visible and most of the rhizomes were in stages of complete collapse or in severe distress. The young, vigorous-growing Johnsongrass was not as susceptible to treatment as those plants that were full grown and in seed stage. The same result was not obtained on dry-land areas as was achieved where ground moisture was present.

#### What's New in Weed Control

One of the most interesting sessions was the evening session on "What's New in Weed Control." A panel was formed by having a chemical company's representative discuss the new chemicals from his firm. Some reported on coded chemicals that are about to be released, while others discussed new uses of older chemicals. Fifteen companies were represented on the panel.

California Chemical Company, Ortho Division, was represented by H. C. Fisher, Whittier, California. Their new products are Diquat and Paraquat. Diquat is available now. Paraquat will be available soon. Both give rapid knockdown of weed growth, Fisher said, and both are odorless and nonflammable and leave no soil residue. Diquat can also be used as an aquatic weed treatment and as an additive for a knockdown treatment with sterilants.

Lyall F. Taylor of E. I. duPont de Nemours of Palo Alto, California, reported Hyvar isocil was available now and Hyvar bromosil will be soon. Both are sterilants for use on industrial and noncrop land. Hyvar isocil has a wider range of weed control at about one-third the rate of Karmex, Taylor said, and is less selective and less sensitive to breakdown from sunlight than Karmex. Suggested rates for the control of annual weeds is up to 4 lbs. per acre.

"Cull" was introduced by Richard Fosse, Amchem Products, Inc., of Niles, California. Cull is a tree-killing chemical in a pressurized can for use in the cut-surface method. With the press of a button, the can releases a measured amount of chemical for each ax cut. One can should treat about 60 trees of six-inch diameter.

Pennsalt Chemicals, represented by Edward J. Bowles of Fresno, Calif., discussed TD-307, a contact herbicide with very short residue. It is intended for use in fallowing programs, along roadsides including landscape plantings. Possible selectivity in crops will be investigated in 1963.

Betasan was discussed by Joe Antognini of Stauffer Chemical Company of Mountain View, California. Betasan is a weed control chemical for turf. It will control crabgrass, annual grasses, and some broadleaved plants. It is of special importance in California for weed control in dichondra and can be used pre-plant, pre-emergence and post-emergence to the dichondra, Antognini said. It also is effective in established grass turfs.

Diamond Alkali Company's new product is Dacthal, reported by Robert Orlik, Jr. of Fresno, Calif. Dacthal is being used in turf grasses as a pre-emergence treatment for crabgrass control.

Banvel D, a product of Velsicol Chemical Corporation, was introduced by the company's Joe O'Brien of Fresno, Calif. It is a 4-pound-per-gallon formulation, and is being used in trials for perennial broadleaved weeds of morning glory, Russian knapweed, and in noncrop land areas and on roadsides.

Diphenamid and trifluralin were introduced by Robert Ascheman of Eli Lilly and Company of Greenfield, Indiana, as their new chemicals. Trifluralin is registered as Treflan for selective pre-emergence weed control in turf and ornamentals. Treflan, Ascheman said, is produced as a 4-pound-per-gallon emulsifiable concentrate and a 2 and 5% granular.

U.S. Borax's V.W. Woestemeyer of Anaheim, Calif., discussed Monobor-Chlorate as a soil sterilant for noncrop land, with emphasis for use under asphalt and for perennial weed control. Annual weeds require ½ lb./100 sq. ft. and perennial weeds up to 4 lbs./100 sq. ft. Tritac, a second chemical, is a soil sterilant for use in noncrop land for perennial broadleaved weeds. Tritac leaves a long soil residue, Woestemeyer concluded.

Thompson-Hayward Chemical Company, through their representative James H. Hughes of Fresno, Calif., reported on Casoron. Applied pre-emergence to the weeds, Casoron has shown activity against a broad spectrum of annual and perennial pest plants. Special uses would include control of nutgrass, dodder, bracken fern, and quackgrass. Casoron, which is selective in ornamentals, is formulated as a 50% wettable powder and a 4% granule, Hughes concluded.

Next year the California Weed Conference will be held in Sacramento, Jan. 21-23, *Weeds and Turf* was told.

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## UK Herbicide Firm Acquires Control of Doggett-Pfeil Co.

Fisons Horticulture Ltd., leading United Kingdom herbicide manufacturer, has purchased a majority interest in the Doggett-Pfeil Co., American producer of soluble and liquid fertilizers, selective weedkillers, turf fungicides, and grass colorants.

"This acquisition provides a base for the establishment of Fisons products in the U.S. horticultural market, and also enables an extension of Doggett-Pfeil's present activities," G. V. K. Burton, chairman of Fisons Horticultural Ltd., announced after the purchase.

Fisons is already well established in Canada, where it is a major distributor of simazine, atrazine, and other herbicides, Burton mentioned.

Firm will be renamed the "Doggett Fison Co.," with S. H. Doggett continuing as president.

## Hooker Has Liquid Herbicide

Tritac, a new liquid herbicide that kills deep-rooted perennial weeds, will be marketed jointly by Hooker Chemical Corp. and U.S. Borax & Chemical Corp., the two companies announced recently.

New chemical was initially synthesized in Hooker Laboratories, and is designed for water-spray application in the control of such deep-rooted weeds as field bindweed, Canada thistle, Russian knapweed, leafy spurge, bur ragweed, and toad flax. Formulation is 2 lbs. per gallon emulsifiable concentrate.

Joint marketing arrangement will provide maximum market penetration for the new herbicide, by taking advantage of the existing national sales coverage and distribution outlets of the two firms, Dr. L. M. Stahler, Director of Agricultural Chemical Sales for U.S. Borax, and Mr. C. E. Gochenour, Manager of Agricultural Chemical Sales for Hooker Chemical, believe.

Tritac will also broaden the line of herbicides supplied by the two companies. Prior to the development of Tritac, U.S. Borax and Hooker marketed only granulated weedkillers for dry application.

For more information on Tritac, write to either U.S. Borax & Chemical Corp., Box 75218, Sanford Station, Los Angeles 5, Calif., or Hooker Chemical Corp., 603 Buffalo Ave., Niagara Falls, N.Y.

## Recommend Silvex & Mecoprop To Control Chickweed in Lawns

Silvex and Mecoprop are effective chickweed controls, a report from the Field Crops Branch of the Ontario (Canada) Department of Agriculture notes.

Neither mowing or weeding will stop this common lawn blight. But the department reports that both sprays have been demonstrated effective in controlling common and mouse-eared varieties of chickweed.

Mouse-eared chickweed is readily identified by the fine, fuzzy hairs that cover the stems and leaves; the common variety has only a strip of hairs along one side of the stem.

Since chemicals may affect grass seedlings, the Field Crops Branch cautions CAs against spraying new lawns. Nor should lawns be treated during hot weeks, since treated lawns need a good deal of water for the sprays to be effective.

## Meeting Dates

**Western Weed Control Conference,** Sheraton Hotel, Portland, Ore., March 20-22.

**2nd Annual Florida Turfgrass Association Trade Show,** Hotel Seville, Miami Beach, Fla., May 2-4.

**Chemical Specialties Manufacturers Assn. Mid-Year Meeting,** Drake Hotel, Chicago, Ill., May 20-22.

**National Plant Food Institute Annual Conference,** Greenbrier Hotel, White Sulphur Springs, W. Va., June 9-12.

**11th Annual Florida Turfgrass Management Conference,** Gainesville, August 27-29.

**16th Annual California Weed Conference,** Sacramento, Jan. 21-23, 1964.

**Weed Society of America Meeting,** Pick-Congress Hotel, Chicago, Ill., Feb. 10-13.

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**Lawn Insects**

(*from page W-15*)

grass is touching) of a home will bring some protection. Prevention of mite entry is doubled if malathion or lindane is applied to this cleared strip. Actual control in the lawn is very difficult.

Another mite was reported by Professor Deal of California who quoted reports of Dr. R. N. Jefferson, also of Riverside. "The Bermudagrass mite (Eriophyidae) lives in the terminal leaf sheaths and its feeding causes stunting, a witches-broom effect, general decline, and eventual death of the stolon." This pest was first observed in Arizona by the California workers in 1959. Since then it has become a pest in southern California. It also causes damage in Nevada, Texas, and Florida. Control it with Trithion or Ethion at chinch bug dosages.

Dr. Jefferson has also reported on the frit fly (*Oscinella frit*), "a new pest in the sense that damage to turf has occurred in California since 1959. The tiny maggots, or larvae, tunnel in the stems near the surface of the soil causing the upper portions of the plant to turn brown and die." Adults can be detected by placing a white object in a suspect area; small flies 1/16 inch long, will be attracted to the object readily. Insecticides effective for chinch bugs and sod webworms will control the frit fly, which ranges into the northeastern quarter of the United States also.

**Cicada Killer**

A pest in Indiana and elsewhere in central and northeastern United States is a species of digger wasp called the "cicada killer." Professor Dave Matthew of Purdue told *Weeds and Turf* that these "annually cause great concern to many homeowners because of the mounds of soil they pile up on lawns when digging burrows in which they place paralyzed cicadas on which their young feed." These wasps, about 1½ inches long and typically marked with yellow and black, can sometimes be seen hovering over or near their burrows regularly each day during midsummer. They will not bother humans unless molested.

In one sense, the cicada killer is beneficial because it is a natural control of cicadas. If turf damage by wasps is extensive, control of these "middle-of-the-roaders" is recommended. Chlordane 10% dust, applied locally (spot treatment) to burrows where returning wasps will walk over it, will give control.

Mole crickets burrow through soil with their enlarged spade-like front legs. They eat roots and uproot seedling and some established grasses. These oddities are about 1½ inches long, brown, and covered with velvety hairs. Mole cricket control is the same as mentioned for other soil-dwelling insects such as white grub and sod webworm. If chlordane is used, the applicator should remember that it is also a weedkiller and should not be used on new lawns. Give seedlings a 5-week head start.

In all cases study and understand the package label. Regardless of the chemical used, follow directions and precautions for safe handling. Have the safety of consumer, children, pets, and wildlife that may come in contact with a treated area firmly in mind.


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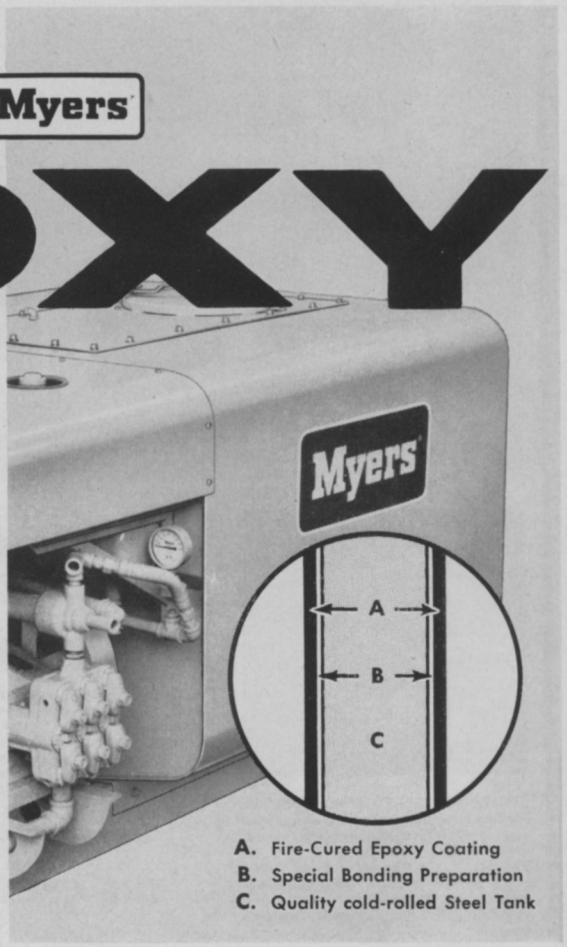


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**Weed Control**

by Alden S. Crafts and Wilfred W. Robbins, McGraw-Hill Book Company, New York, N.Y., 1962, 660 pp., $14.75.

History of plants, evolution of weeds, principles and economics of plant control, recent advances in herbicide research, and new equipment for application, are all welded together in the third edition of *Weed Control*. Written by Dr. Alden S. Crafts and the late Dr. Wilfred W. Robbins, both of the University of California and California Experiment Station, this book should not go unused by contract applicators.

Five of the 24 chapters introduce readers to weeds as plants and give ideas of the history of this formidable adversary. Weeds were "created" by man's desire to be rid of them. Many plants regarded as weeds today were once used as food. Seeds of plants which we now consider weeds were found in the stomach of a preserved Iron Age man, for example.

Special features which the authors point out, such as rates of reproduction, method of seed dispersal, and general hardiness, may produce a rebel from domestication such as Johnsongrass, which has caused more trouble than its original intent was worth.

After laying groundwork of control and chemical principles, the authors proceed to detail herbicides used in the battle against weed pests. Taken from a standpoint of action of herbicides rather than uses in specific crops, 11 chapters on selective and nonselective herbicides help readers better understand related compounds and methods by which they kill weeds. Each compound is treated historically from its discovery through recent research.

Relevant principles of general chemistry are fitted into the text and clearly explained so that chemical novices, too, can understand and learn. Free use is made of comparative and before-after photographs showing successes in weed control research and practice. Not a regional textbook, *Weed Control* draws information from all over the world, which gives readers a broader view of this expanding field and makes for interesting and sometimes exotic reading.

Chapters on herbicide combinations, equipment old and new, and application techniques will no doubt give some readers fresh ideas with which they can run a weed control business more successfully.

Turfgrasses are included as crops in a 49-page chart of selective control chemicals, rates, application times, and volumes per area of spray. Likewise, charts of nonselective or soil sterilant application rates are valuable to those in industrial weed control.

Those in forest, ditchbank, railroad, or aquatic weed areas will appreciate the inclusion of remarks about these developing fields. Consideration is given whether applications are made by knapsack or airplane; the authors hope to reach a wide audience.

Appendices, complete with conversion tables, measures, weight and cost formulas, along with the recommended rate charts, make this text a valuable reference manual which a progressive weed controller should not be without.

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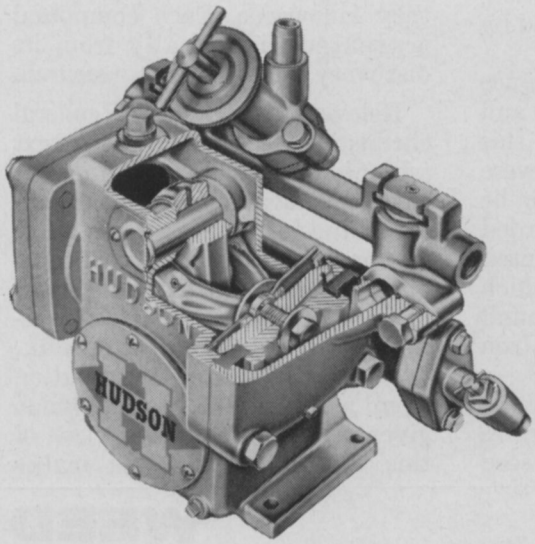


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**So. Weed Conference Report**

(*from page W-18*)

and specifications of the machine handle the drift hazard, he added.

"Application represented at least a 20% reduction in the amount of concentrate needed, with evidence of equal or greater top and root kill, compared with the conventional hydraulic system," Yazell concluded.

**Aquatic Weed Control Covered**

Of the numerous chemicals evaluated for aquatic weed control, xylol-type aromatic solvent, one of the first recommended, continues to be widely used, Dr. F. L. Timmons, of the Crops Research Div., USDA, Laramie, Wyoming, reveals. "More than 500,000 gallons of xylol-type aromatic solvents are now used annually," Timmons notes.

Two of the most promising weed control chemicals yet are Diquat and Paraquat, A. C. White, Field Technical Specialist from Ortho Div., California Chemical Co., Orlando, Fla., told CAs interested in aquatic weed problems.

"Fast absorption into the plant, systemic movement within the plant, and necessity of sunlight to exhibit killing action are all characteristics of the two solutions," White claims.

"If applied just before dark, allowing the chemical to circulate throughout the plant before the sun brings out full killing power, ⅓ less solution is needed," White affirmed. In daylight, the kill is so rapid that this movement is short-circuited by the rapid death of the tissue, he purported.

"Diquat and Paraquat, in addition to promising control of 22 different kinds of aquatic pest plants, have shown no kill of fish and no adverse effect on fish food production in treated ponds," White concluded. "These results forecast a useful future for these herbicides."

**First Scholarships Awarded**

College seniors from North Carolina, Virginia, and Tennessee, and a recent graduate now working at weed control in Texas, were awarded the first Southern Weed Conference scholarship awards for graduate study. Winners also received a free trip to the meeting, and are honorary members for 1963.

R. D. Camper, N.C. State University, received the $500 first-prize award. Second prize of $200 went to A. B. Rogerson, VPI in Blacksburg, Va. Other winners in the contest were H. R. Bayless, University of Tennessee, Knoxville, who received the $50 third prize, and Randall Jones, supervisor of a weed control region in Tulia, Texas, who was awarded the $25 fourth prize.

Elections held during the conference made R. F. Richards, Geigy Chemical Co., Orlando, Fla., president for 1963; R. E. Frans, University of Arkansas agronomy researcher in Fayetteville, was elected vice president; and the secretary-treasurer is Henry Andrews, University of Tennessee.

At the conclusion of the conference, it was announced that the 1964 meeting will be held in Jackson, Miss., with the dates and location to be named later.

*Know Your Species*

**GROUND IVY**

*(Glecoma hederaced)*

Ground ivy is a perennial, reproducing both by seed and rooting at the joints of creeping stems. It is common in shaded areas near buildings, under trees or shrubbery throughout Northern United States and Southern Canada. Ground ivy especially favors rich damp soil of lawns, gardens, and orchards, although it is generally found elsewhere. Native of Eurasia, this creeping weed flowers from April to June.

Stems are characteristically 4-sided, creeping or trailing; flowers are borne in the axils of leaves on the stems which stand erect. Leaves are bright green, opposite one another on the stem, and palmately veined (like the fingers of one's hand). Edges of the circular leaves, ½ to 1½ inches in diameter, are scalloped or round-toothed.

Flowers are tubular with a lip, and bluish purple. The seeds are classified as nutlets which are ovoid, granular and brown.

Ground ivy is particularly difficult to control by mechanical means because of its extensive system of stolons or creeping stems. Pulling up the visible portion of the plant by no means destroys it, but leaves many small pieces of root which persistently resprout to cause another infestation.

Ground ivy is well controlled by spraying with silvex. Sprays of 2,4-D and 2,4,5-T are less effective but repeated sprays should wipe out ground ivy.

*Prepared in cooperation with Crops Research Division, Agricultural Research Service, United States Department of Agriculture, Beltsville, Maryland.*

DRAWING BY REGINA HUGHES, USDA, BELTSVILLE

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contains calcium acid methyl arsonate (liquid)

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contains disodium methyl arsonate (70% powder)

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contains 75% Thiram

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**Soil Sterilization**
*(from page W-12)*

30 pounds per acre. It will be available as an emulsifiable concentrate.

**Organic: Symmetrical Triazines**

Simazine, 2-chloro-4,6-bis(ethylamino)-s-triazine, applied at high rates, is an effective soil sterilant. Proven as a chemical cultivator, simazine at 10 to 40 pounds active per acre will sterilize soil where there is no problem of deep-rooted perennials. Simazine tends, because of its lack of solubility, to remain near the surface, killing annual weeds as they germinate. When weedkilling oils are added to simazine or atrazine, only 5 to 15 pounds of active ingredient need be applied for control. Generally two treatments, one month apart in early summer, will suffice.

Atrazine, 2-chloro-4-(ethylamino)-6-(isopropylamino)-s-triazine, bears the same relationship to simazine as monuron does to diuron. Atrazine is more soluble than simazine, but both are applied at the same rates for soil sterilization.

**Time to Apply**

Generally, a good time to apply soil sterilants is before the weeds mature. The spring and fall are both good times to prevent weed growth. Application and complete soil coverage are easier without interference of full-grown weeds. Cooler temperatures are less conducive to bacterial action in the soil and therefore enhance the residual of an herbicide. But heavy snow and rain may leach the chemical away, so winter precipitation must be considered when chosing an overwinter herbicide.

Since soil sterilants are usually applied to relatively large areas, power equipment is considered the most economical. Either manually directed hoses or fixed booms would be satisfactory as long as even distribution is obtained. Broadcasting equipment such as Cyclone seeders and air guns are the most efficient for applying pelletized herbicides.

Nature of the chemical, time of year, soil type, temperature, the kind of weeds, and the size of the job will all help determine whether spray or dry preparations should be used.

## Trimmings

*Airing opinions.* Two old pros at the Aquatic Weed Control Society meeting last month were applicators Henry Carsner and E. V. Scholl, who gave delegates some good pointers on equipment for waterweed jobs. Hank's specialty is development of air boats, which he works on at his Northwest Weed Control Company in Tacoma, Wash. Vic Scholl, a familiar person at meetings of aquatic applicators, runs Modern Weed Control in Grand Rapids, Mich. Both experts, while from widely separated parts of the country, have sound know-how in common, and the conference was enriched by their comments. Our reporter was on hand at the Chicago meeting, but because of an early presstime, we've saved our detailed report of what transpired there for next month.

* * *

***Pacesetting PCOs.*** **We've been talking about PCOs who've branched into weed or turf and ornamental work quite a lot recently, and at the Purdue PCO Conference in January we ran into another versatile pest controller, Charles Warfield of Home Exterminating in Salisbury, Md. Chuck says one of his specialities is spraying golf course ornamentals for control of scales and other pests, and we wonder how many operators are looking into this new line. After all, it's a field which is coming rapidly into the fore. And what better way to spend an afternoon on the course than this, armed with spray gun, golf shoes, and a set of clubs!**

* * *

*No sittting duck.* William H. Drake, an entomologist who runs Drake Chemical Company in Perrysburg, Ohio, is another example of the versatility of spraymen today. Bill, who's a graduate entomologist, is nevertheless active in the weed control business on a custom basis. And if this isn't enough to keep him busy, he also manufactures and distributes chemicals and equipment for operators in the Great Lakes area. Obviously Bill's not a man to duck out of a time-consuming job!

* * *

***Take it for granted.*** **Each year the North Central Weed Control Conference presents an award for the outstanding job done in weed control for the current year. Canadian Douglas H. Grant, agricultural representative for Swift in Saskatchewan, was the lucky winner for 1962, a Canadian correspondent just wrote us. Doug earned the honor through his efforts in which he (1) promoted a Canadian Weed Control Week, (2) helped organize 12 weed sprayer field days, and (3) sparked an essay contest on weed work among no less than 20 4-H clubs in the province to our north. Doug told about his "weed control week" at the conference last December, and we join other delegates in congratulating this hard-working benefactor of our industry.**

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*Raise a Furrer?* Applicators in Jefferson County, New York, have lost a good right arm in former associate county agent Armin Furrer. We just learned that Armin recently accepted a position on the Agronomy Department staff at Cornell, where he'll work primarily with life history studies of perennial weeds. No doubt CAs who called on Mr. Furrer for help will miss his efforts, but it's good to know the big weed projects at Cornell will benefit from the former county agent's experience in the field.

# why settle for HALF the pest control business you can handle?

A booming demand for weed control and turf spraying has hit most areas. Pest control operators jumping into the weed and turf field to meet the demand find the market promising — and profitable. YOU can branch out into this "other half" of the pest control business, and make money doing it, with the help of T-H Malathion from our Philips Roxane Division.

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